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IS 10945 (1984): Shanks for footwear [CHD 19: Footwear]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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IS : 10945 - 1984

Indian Standard
SPECIFICATION FOR
SHANKS FOR FOOTWEAR

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

SPECIFICATION FOR SHANKS FOR FOOTWEAR

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Indian Standard

SPECIFICATION FOR SHANKS FOR FOOTWEAR

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 15 March 1984, after the draft finalized by the Footwear Sectional Committee had been approved by the Chemical Division Council.

0.2 The shank is a vital reinforcing bottom component of a footwear contributing to shape retention, support to longitudinal foot arch, assistance to foot in its various activities, stability and strength to footwear waist and firmness to heel (particularly when the heel is extremely high), serving as a bridge between heel and forepart, and waist and seat bottom filling.

0.3 Since the footwear is raised by the addition of a heel, the use of a shank as a reinforcer becomes necessary, — the higher the heel the more critical the need for a suitable shank, reaching its optimum in sandalised women's footwear, in which, by its very structure, all the strain and stress of foot activities are on the bottom, particularly the waist and the heel which tend to incline in or out if the shank is not of the correct kind.

0.4 Obviously leather alone is not rigid enough to serve as a shank. Recourse is taken to ribbed spring steel shank of different forms and shapes, mounted on a strong base made out of suitable materials. Shanks are essential for medium to high-heel footwear, for those with very low heels, its use depends on customer's specification.

0.5 Shank-making material naturally depends on type of footwear, constructional method, purpose of use and above all the particular demand on the footwear to be made. High-grade carbon steel and a combination of steel and mill board or synthetic material have almost completely replaced the wood. Modern shoe industry considers steel shank as the most desirable which certainly offers incomparable advantages like stability, flexibility and support. It can be fitted to the bottom contour of the last more rigidly.

0.6 The shank becomes a very significant accessory for the manufacture of all closed types of civilian and occupational footwear.

0.7 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes requirements and methods of sampling and test for various types of shanks required for manufacturing of footwear for adults, juniors and children.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 2050-1967†, IS : 707-1978‡ and IS : 1570 (Part 2)-1979§ shall apply.

3. TYPES

3.1 This standard covers the following four types of shanks:

Type 1 — Steel shank;

Type 2 — Combined wood, mill board, steel and plastic shanks;

Type 3 — Fibre-board shank; and

Type 4 — Wooden or bamboo shank.

4. REQUIREMENTS

4.1 Shape and Design

4.1.1 *Type 1 Steel Shanks*

4.1.1.1 The surface pattern and designs of steel shanks shall be as given in Fig. 1.

4.1.1.2 *Flutting shanks (reinforcing groove)* — The majority of steel shanks are fluted which increase their strength considerably without adding to their mass. The indentation, which is put during the curve moulding operation prior to tempering, extends between 60 to 70 percent length of the shanks.

4.1.1.3 Guideline for designing shanks is illustrated in Fig. 1B. The shanks shall be designed accordingly.

*Rules for rounding off numerical values (revised).

†Glossary of footwear terms.

‡Glossary of terms applicable to timber technology and utilization.

§Schedules for wrought steels for general engineering purposes: Part 2 Carbon steels (unalloyed) steels (first revision).

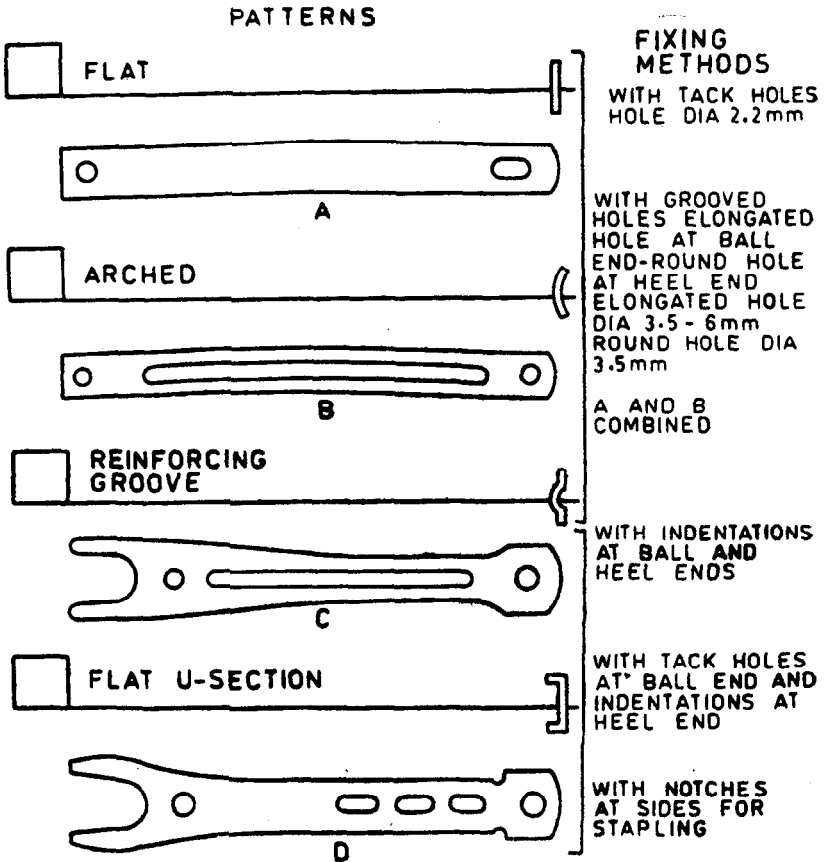
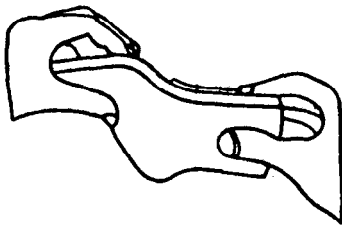


Fig. 1A Surface Pattern of Shanks



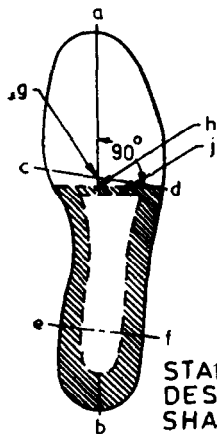
THE SPRINGING OF THE SHANK SHALL EXACTLY CORRESPOND TO THE CONTOUR OF LAST BOTTOM PROFILE (WITH LASTING INSOLE)



THE SHANK HAS MORE SPRING THAN LAST. THE HEEL STANDS ONLY ON REAR PART OF THE HEEL-LIFT



THE SHANK HAS LESS SPRING THAN LAST. THE HEEL STANDS ONLY ON FRONT PART OF THE HEEL-LIFT



STANDARD OF DESIGNING SHANK



THIS SHOWS WRONG WORKING METHOD OF SHANK DESIGNING BY FOLLOWING BALL LINE DIRECTION

1B Designing of Shanks

FIG. 1 STEEL SHANKS

4.1.1.4 As the heel becomes higher the need for absolute rigidity becomes greater, and only correct shaped high-grade steel is suitable for the purpose. All the footwears above 25 mm heel heights shall have steel shanks. The enormous variety of heel height, waist curve and types of footwear means a corresponding diversity in steel shank shape which are given in Fig. 2 to 5.


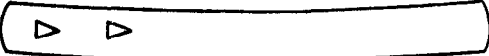


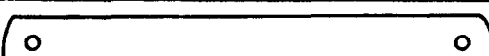

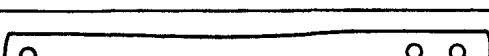

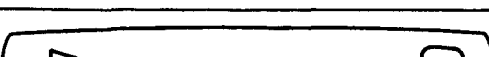
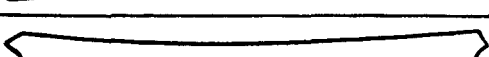
	WITH SECURING TACKS (1 EACH) ON THE OUTSIDE CURVE, BALL OF THE FOOT AND HEEL
	WITH 2 SECURING TACKS ON THE HEEL AND OUTSIDE OF THE CURVE
	WITH 2 PIPS BY MEANS OF WHICH THE SHANK IS FASTENED WITH WIRE
	WITH 2 RIVET HOLES
	WITH 2 TACK HOLES
	WITH 2 TACK HOLES ON THE OUTSIDE CURVE
	WITH 3 TACK HOLES
	WITH 1 RIVET HOLE AND 1 RIVET SLIT
	WITH 1 SLIT AND 1 SECURING TACK
	WITH 2 SECURING TACKS ON THE BOTH ENDS

FIG. 2 PLAIN AND FLAT TYPE SHANKS

4.1.1.5 Plain or flat type shanks (see Fig. 2) — For all types of footwear in low, medium and high heel up to 50 mm, plain or flat type of steel shank which has parallel sides shall be used. A small hole shall be punched at each end, so that it may be tacked to the insole of the footwear. Instead of tacks, staples may be used to give a more secure fastening. In this case, holes are replaced by cut outs at either side at the ends.

4.1.1.6 Fiddle or fork shank (see Fig. 3) — For satisfactory results on very high-heel shoes (above 50 mm), this type of shank shall be used and it is absolutely essential. This may be also used for women's flat and medium spring heel shoes.

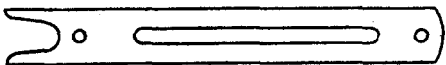
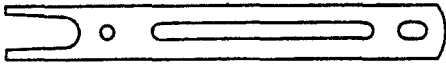
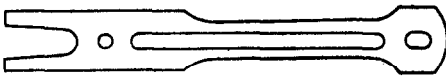
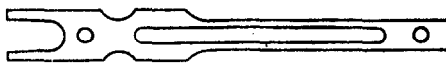
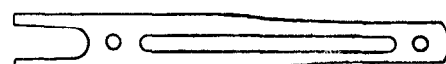
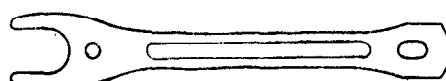
1		PARTICULARLY SUITABLE FOR LADIES SHOES WITH FLAT SPRING
2		A ROBUST SHANK SUITABLE FOR BOTH FLAT AND HIGH SPRING
3		FEATURING THE SAME ADVANTAGES AS SHANK No. 2 EXCEPT DESIGN
4		FOR STAPLING AND TACKING
5		ROBUST AND IS SUITABLE FOR FLAT AND HIGH SPRING
6		FOR CARRYING HEAVY LOADS AND FOR LIGHT SANDALS

FIG. 3 FIDDLE OR FORK SHANK

4.1.1.7 Arched shanks (see Fig. 4) — These shall be used, if necessary, in all types of costly and fashionable sandals.

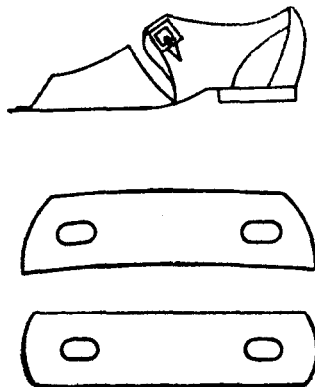


FIG. 4 ARCHED SHANKS FOR SANDALS

4.1.1.8 Orthopaedic shanks (see Fig. 5) — In very high-class corrective shoes and some heavy duty footwear, this type of steel shank which is very much wider than described above shall be used. They shall be shaped and moulded so as to form an arch support for the foot. There may be double or triple flutting lengthwise and even flutting across at the wide end.

4.1.2 Type 2 Combination Shank (see Fig. 6) — In both men's and women's welted and high grade footwear combined steel and fibre mill board, wooden and fibre mill board, or steel and plastic shanks are used. The steel or wood providing rigidity and the board or plastic acting as a filler. The steel shall be plain or fluted.

NOTE — There is also one special type of combined shank which really forms a class by itself. This is called in the trade as 'UNI SHANK' assembly. In this method straight steel shank has furred hole at one end and deep flute. This is then cemented very accurately in position between the insole and a premoulded fibre mill board reinforcement, so that the three components become one inseparable unit possessing the extreme rigidity so essential to a high-grade, high-heel facing footwear.

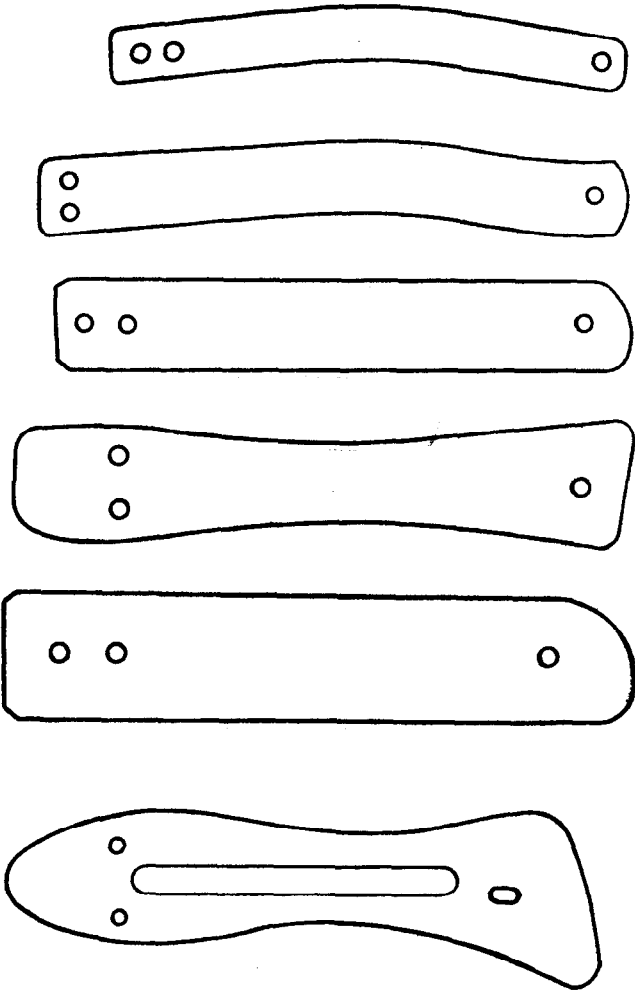


FIG. 5 ORTHOPAEDIC SHANKS

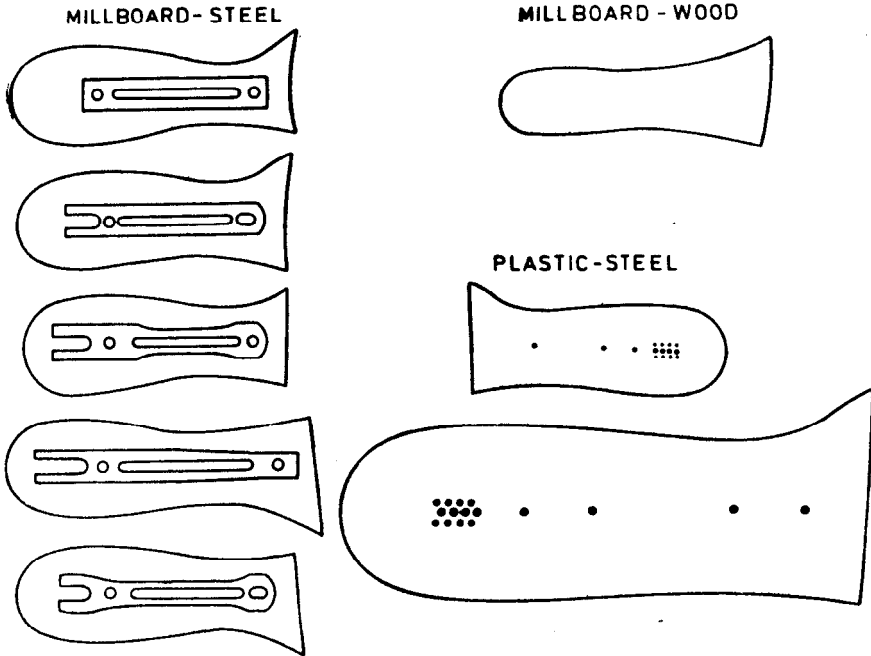


FIG. 6 COMBINATION SHANKS

4.1.3 Type 3 Fibre Board Shank (see Fig. 7) — Fibre-board shanks are used in the same types of footwear as are wooden ones. They can be made in a much wider variety of shape and substance and are very suitable for women's machine sewn and cemented shoes. They are not so inflexible in use as wood and can be moulded to the accurate shape of the last bottom.

4.1.4 Type 4 Wooden or Bamboo Shank (see Fig. 8) — The use of wooden shanks shall normally be restricted to all types of footwear for all categories which carry a low heel and in consequence have little curvature in the waist for its tendency to break down under the mass of the body.

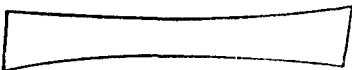
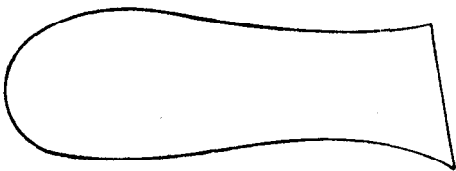


FIG. 7 FIBRE BOARD SHANKS

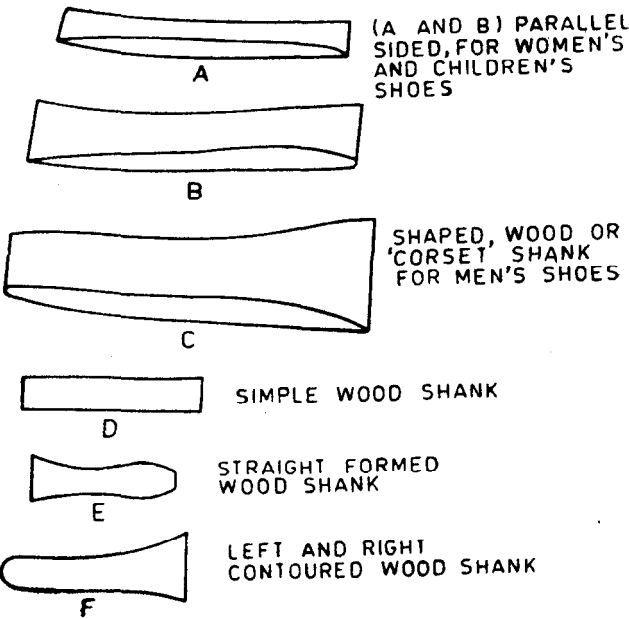


FIG. 8 WOODEN OR BAMBOO SHANKS

4.2 Material

4.2.1 Type 1 — The steel shanks shall be made from high grade carbon steel conforming to Grade 75 C 6 of IS : 1570 (Part 2)-1979*.

4.2.2 Type 2 — The combination shank shall be of:

- a) Wood and mill board (see IS : 2617-1967†),
- b) Steel and plastics, and
- c) Mill board and steel.

4.2.3 Type 3 — The fibre board shank shall be made from grey board or straw board (see IS : 2617-1967†).

4.2.4 Type 4

4.2.4.1 Wood — The following timbers shall be used:

1. Aini (*Artocarpus hirsuta*)
2. Amari (*Amoora* spp.)
3. Andaman Padauk (*Pterocarpus dalbergioides*)
4. Birch (*Betula* spp.)
5. Benteak (*Lagerstroemia lanceolata*)
6. Bola (*Morus laevigata*)
7. Chickrassy (*Chukrasia tabularis*)
8. Champak (*Michelia champaca*)
9. Gamari (*Gmelina arborea*)
10. Gardenia (*Gardenia gummiifera*)
11. Hattipaila (*Pterospermum acerifolium*)
12. Haldu (*Adina cordifolia*)
13. Kaim (*Mitragyna parvifolia*)
14. Kala siris (*Albizia odoratissima*)
15. Maple (*Acer* spp.)
16. Mango (*Mangifera indica*)
17. Pitraj (*Aphanamixis polystachya*)
18. Sissoo (*Dalbergia sissoo*)

4.2.4.2 The wood shall be free from inherent and seasoning defects. The moisture content of wood in the finished shank shall not exceed 12 percent.

*Schedule for wrought steels for general purposes: Part 2 Carbon steels (unalloyed) (first revision).

†Specification for mill board, grey board and straw board (first revision).

4.2.4.3 The following defects in the wood shall not be permitted:

- a) dirt,
- b) decay and knot,
- c) fungal attack,
- d) wormholes and insect damages,
- e) crossgrain and special grain,
- f) pith,
- g) splits,
- h) knots,
- j) cracks, and
- k) honey combing.

4.2.4.4 *Bamboo* — Only the grain layer (bark) shall be used (*see* Note).

NOTE — Although this types of bamboo shanks are in use in our country for a long time, but nowadays the availability and the price of bamboo has increased due to more profitable application in other various trades and industries. As such, it is absolutely impossible to get only the bark of the bamboo for making shank and is also very uneconomical.

4.3 Guideline to Manufacture of Shanks

4.3.1 Type 1

4.3.1.1 The shanks shall be cut from high grade carbon steel of 1'0 to 1'20 mm either from a ribbon of one shank width or side by side from a strip where width equals the shank length.

4.3.1.2 The necessary holes shall then be punched.

4.3.1.3 The flat shanks shall be placed between the dies for bending, flutting, and rubbing under high-power press or hand press.

4.3.1.4 Proper heat treatment shall be given to achieve the hardness from 44 to 48 RHC.

4.3.1.5 The ordinary type shall have parallel sides and a small hole punched so that it shall be tacked to the insole of the footwear.

4.3.1.6 Instead of tacks, staples may be used to give a more secure fastening. In this case the holes shall be replaced by cut-outs on either side of the ends.

4.3.1.7 Fiddle steel shanks shall be made from 12 ± 1 mm width steel and shall be full width for about half the distance from the heel

end, then narrowing to 9 mm in the waist and fore part. Fiddle shanks shall also conform to the following:

- a) They shall have V-shaped cut out at the seat and 10 to 12 mm long to permit the passage of the screw during temporary heel attaching.
- b) Other methods of attachment may not require this cut out, it is the general practice to make all fiddle shanks with it.
- c) In addition they shall have the usual tack holes although they may be stapled into position across the legs of the V-cut at the seat end by covering them with a fabric tube or adhesive tape. These may be cemented in position. Different colours of the fabric shall be used for size identifications.

4.3.2 Types 2 and 3

4.3.2.1 These shall be cut by adjustable knives from a strip of the board and skived by the usual method and then moulded to shape by the roller (*see Note*).

NOTE — These are not so inflexible in use as wood and can be moulded down to the last much more accurately since this spreads slightly under pressure and forms a more satisfactory filler than the wooden.

4.3.2.2 Fibre shanks are frequently combined with wood and steel to give added rigidity (*see Note*).

NOTE — The steel or wood provides rigidity and the board acts as a filler.

4.3.2.3 Shaped wood or steel (plain fluted) shanks shall be attached to shape board either by means of stapling or by riveting.

4.3.3 Type 4

4.3.3.1 The wood shanks shall be cut from specified timber in thickness between 15 to 3 mm and according to the prescribed curvature and length between 50 to 125 mm according to types of footwear, category and size range (*see Fig. 8*).

4.3.3.2 The cut pieces in accordance with required length, breadth and thickness and curved lengthwise to match the contour of the last waist under steam pressure, would be ideal. This system of steaming and then forming under appropriate die or mould by pressure gives the wood shank a very good, long-lasting curved profile and spring action required for good footwear making.

4.3.3.3 In accordance with the requirement of footwear construction, they shall be either reversible, that is, either end can be placed at the heel or reversible, the later having a deeper asymmetrical curve.

4.3.3.4 The following requirements (*see* Fig. 8) shall be considered as guideline for making wooden shanks — Type 4 for different construction of footwear.

- a) *Simple shank (straight — parallel sides)* — Shank shall be skived at waist and both sides for all designs of construction and shanks shall be skived at all four-sides and flexible (*veldtschoen*) while stitch at down construction.
- b) *Straight formed shank* — All four sides skived for all construction, specially men's welted construction high class footwear. This in the trade is also called as 'CORSET' shank. They shall be wide in the centre and heel portion and wider in the fore part.
- c) *Right and left contoured shank* — These special classes of wooden shanks are used in football boot, mostly in sports footwear, heavy duty and mountaineering boots, etc (*see* Note).

NOTE — The practice of skiving at each end along the sides are done so as not to show in the finished footwear. Wooden shanks are also sometime used to fill the space between the insole channel in men's welted footwear.

4.4 Dimensional Requirements

4.4.1 *Type 1 (Steel Shanks)* — It shall conform to Fig. 1, 2, 3, 4 and 5.

4.4.2 *Types 2 and 3* — Thickness — 2 mm, length — from heel to a little behind break of joint. Width — shape according to last so as to serve also as a filler.

4.4.3 *Type 4 (Wooden Shanks)* — The minimum requirement for the width, thickness and length of wood shanks shall be as given in **4.4.3.1** to **4.4.3.3**.

4.4.3.1 *Width* — Not less than 12 mm for children sizes 3 to 12 and 19 mm for adult for sizes 2 to 13 when measured at the narrowest cross-section.

4.4.3.2 *Thickness* — Thickness shall be in between 1.5 to 3 mm when measured at the full unbevelled section.

4.4.3.3 *Length* — The length for straight-parallel sides of shanks shall vary from 8 cm (child size 11) to 14 cm (men's size 11) in 4 mm steps.

5. PACKING AND MARKING

5.1 The shanks shall be packed as specified in the contract.

5.2 The shanks shall be marked with name and type, manufacturer's name or trade-mark and the quantity batch number or date of manufacture shall be marked on each packet.

5.2.1 The shanks may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

6. SAMPLING AND CRITERIA FOR CONFORMITY

6.1 The scale of sampling and the criteria for conformity of the material to the standard shall be as given in Appendix A.

APPENDIX A

(Clause 6.1)

SCALE OF SAMPLING AND CRITERIA FOR CONFORMITY

A-1. SCALE OF SAMPLING

A-1.1 Lot — All shanks in a consignment of the same type shall constitute a lot.

A-1.2 The conformity of the shanks to the requirements of this specification shall be ascertained for each lot separately. Each shank shall be the unit of sampling. The number of shanks to be selected from each lot shall be in accordance with col 1 and 2 of Table 1.

TABLE 1 SCALE OF SAMPLING AND PERMISSIBLE NUMBER OF DEFECTIVE SHANKS

LOT SIZE <i>N</i>	FOR SHAPE, DESIGN, CONSTRUCTION AND DIMENSIONS		NO. OF SHANKS TO BE TESTED FOR MATERIALS
	No. of Shanks <i>n</i>	Permissible No. of Defectives	
(1)	(2)	(3)	(4)
Up to 50	5	2	2
51 to 200	8	3	3
201 to 500	13	5	3
501 to 1 000	20	7	5
1 001 and above	32	10	5

A-1.3 The shanks shall be selected at random from the lot. If the shanks are packed in a number of boxes, at least 20 percent of the boxes shall be opened and equal number of shanks shall be selected from each box to constitute the required sample.

A-2. NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

A-2.1 All the shanks selected under A-1.2 shall be examined for shape, design, construction and dimensions. A shank shall be termed as defective if one of the shanks fail to satisfy the requirements for shape, design, construction and dimensions. The lot shall be accepted as conforming to the requirements if the number of defective shanks found does not exceed the permissible number of defective shanks given in col 3 of Table 1.

A-2.2 For examining the lot in respect of material, the number of shanks to be tested is given in col 4 of Table 1. There shall be no failures if the lot is to be deemed satisfactory for this requirement.